

Application of: Chang et al.  
Serial No.: 10/672,236  
Filed: September 25, 2003  
Supplemental Response in light of Telephone Interview

### AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A computer system for optimizing processing of an annotation request from a client, comprising:

a request processor configured to receive said annotation request from said client, to query a memory to find relevant information corresponding to said annotation request, and to break said annotation request down into a plurality of constituent tasks if said relevant information is not found;

a task queue for storing the plurality of constituent tasks that need to be performed for said annotation request, wherein said plurality of constituent tasks includes annotating a retrieved web page with additional hyperlinks;

a ~~thread-controlling means~~ controller for maintaining a plurality of threads;

~~an assigning means~~ a thread assignor for assigning said plurality of ~~threads~~ threads to said plurality of constituent tasks in said task queue; and

a task ~~execution means~~ executer for concurrently executing the plurality of constituent tasks in the respective plurality of threads to completion on the request processor.

2. (Original) A computer system according to claim 1, wherein said plurality of threads is independent from said plurality of constituent tasks stored in said task queue.

3. (Original) A computer system according to claim 1, wherein said plurality of threads is persistent.

4. (Original) A computer system according to claim 1, wherein said plurality of constituent tasks is arranged in a substantially first-in-first-out basis within said task queue.

5. (Original) A computer system according to claim 1, wherein when a thread is available for assignment, said thread is assigned to a constituent task when said constituent task is ready for execution.

6. (Original) A computer system according to claim 5, wherein said assigned thread is released upon conclusion of said constituent task.

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7. (Currently Amended) A computer system for optimizing processing of an annotation request from a client, comprising:

a request processor configured to receive said annotation request from said client, to query a memory to find relevant information corresponding to said annotation request, and to break said annotation request down into a plurality of constituent tasks if said relevant information is not found;

a task queue for storing the plurality of constituent tasks that need to be performed for said annotation request according to claim 1, wherein said plurality of constituent tasks includes checking a cache to determine whether information pertaining to said annotation request is present in said cache;

a thread controller for maintaining a plurality of threads;

a thread assignor for assigning said plurality of threads to said plurality of constituent tasks in said task queue; and

a task executer for concurrently executing the plurality of constituent tasks in the respective plurality of threads to completion on the request processor.

8. (Currently Amended) A computer system according to claim 1, wherein said plurality of constituent tasks further includes retrieving information pertaining to said annotation request from one or more sources.

9. (Original) A computer system according to claim 8, wherein said one or more sources include the Internet.

10. (Canceled)

11. (Original) A computer system according to claim 1, wherein said plurality of constituent tasks includes updating a cache with annotated information.

12. (Original) A computer system according to claim 1, further comprising:

a I/O queue for storing a plurality of I/O tasks identified from said plurality of constituent tasks, wherein said plurality of I/O tasks only perform input and/or output functions.

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13. (Original) A computer system according to claim 12, wherein two or more of said plurality of I/O tasks are executed in a parallel manner.

14. (Original) A computer system according to claim 12, wherein said task queue is notified upon completion of each of said plurality of I/O tasks.

15. (Previously Presented) A computer system according to claim 14, wherein upon said notification one or more of said plurality of constituent tasks which require results from said completed I/O tasks are rendered ready for execution.

16. (Currently Amended) A computer system for optimizing processing of an annotation request, comprising:

a request processor configured to receive said annotation request from said client, to query a memory to find relevant information corresponding to said annotation request, and to break said annotation request down into a plurality of requisite tasks needed to execute said annotation request, wherein said plurality of requisite tasks includes annotating a retrieved web page with additional hyperlinks;

a task queue for storing the plurality of requisite tasks needed to execute said annotation request; [[and]]

a ~~thread-controlling means~~ controller for controlling a thread pool having a plurality of threads; wherein said thread-controlling means controller assigns an available thread from said thread pool to an execution-ready requisite task and the request processor executes the requisite task in the assigned thread to completion concurrently with the execution of other tasks in other threads; and

a task executor for concurrently executing the plurality of constituent tasks in the respective plurality of threads to completion on the request processor.

17. (Original) A computer system according to claim 16, said thread pool is independent of said plurality of requisite tasks.

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18. (Original) A computer system according to claim 16, wherein said assigned thread is released back into said thread pool for subsequent assignment when the execution of said execution-ready requisite task is completed.

19. (Currently Amended) A method for optimizing processing of an annotation request received from a client at a request processor, comprising the steps of:

receiving said annotation request from said client;

querying a memory to find relevant information corresponding to said annotation request;

breaking said annotation request down into a plurality of constituent tasks needed to complete the execution of said annotation request, wherein said plurality of constituent tasks includes annotating a retrieved web page with additional hyperlinks;

storing said plurality of constituent tasks into a task queue;

maintaining a plurality of threads assignable to said plurality of constituent tasks;

assigning an available thread to a constituent task when said constituent task is ready for execution; and

executing the constituent task in the assigned thread on the request processor to completion concurrently with other threads executing tasks on the processor.

20. (Previously Presented) A method according to claim 19, further comprising the steps of:

identifying a plurality of I/O tasks from said plurality of constituent tasks;

storing said plurality of I/O tasks into an I/O queue, separate from the task queue; and

executing two or more of said plurality of I/O tasks in a parallel manner.

21. (Original) A method according to claim 20, further comprising the step of:

rendering one or more constituent tasks which require results from said executed I/O tasks ready for execution.

22. (Original) A method according to claim 19, wherein said plurality of threads is persistent.

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23. (Original) A method according to claim 19, wherein said assigning of said available thread to said constituent task is independent of the nature of said constituent task.

24. (New) A computer system according to claim 7, wherein said plurality of threads is independent from said plurality of constituent tasks stored in said task queue.

25. (New) A computer system according to claim 7, wherein said plurality of threads is persistent.

26. (New) A computer system according to claim 7, wherein said plurality of constituent tasks is arranged in a substantially first-in-first-out basis within said task queue.

27. (New) A computer system according to claim 7, wherein when a thread is available for assignment, said thread is assigned to a constituent task when said constituent task is ready for execution.

28. (New) A computer system according to claim 27, wherein said assigned thread is released upon conclusion of said constituent task.

29. (New) A computer system according to claim 7, wherein said plurality of constituent tasks further includes retrieving information pertaining to said annotation request from one or more sources.

30. (New) A computer system according to claim 29, wherein said one or more sources include the Internet.

31. (New) A computer system according to claim 7, wherein said plurality of constituent tasks includes updating a cache with annotated information.

32. (New) A computer system according to claim 7, further comprising:  
a I/O queue for storing a plurality of I/O tasks identified from said plurality of constituent tasks, wherein said plurality of I/O tasks only perform input and/or output functions.

33. (New) A computer system according to claim 32, wherein two or more of said plurality of I/O tasks are executed in a parallel manner.

34. (New) A computer system according to claim 32, wherein said task queue is notified upon completion of each of said plurality of I/O tasks.

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35. (New) A computer system according to claim 34, wherein upon said notification one or more of said plurality of constituent tasks which require results from said completed I/O tasks are rendered ready for execution.

36. (New) A computer system for optimizing processing of an annotation request, comprising:

- a request processor configured to receive said annotation request from said client, to query a memory to find relevant information corresponding to said annotation request, and to break said annotation request down into a plurality of requisite tasks needed to execute said annotation request, wherein said plurality of requisite tasks includes checking a cache to determine whether information pertaining to said annotation request is present in said cache;

- a task queue for storing the plurality of requisite tasks needed to execute said annotation request;

- a thread controller for controlling a thread pool having a plurality of threads, wherein said thread controller assigns an available thread from said thread pool to an execution-ready requisite task and the request processor executes the requisite task in the assigned thread to completion concurrently with the execution of other tasks in other threads; and

- a task executor for concurrently executing the plurality of constituent tasks in the respective plurality of threads to completion on the request processor.

37. (New) A computer system according to claim 36, said thread pool is independent of said plurality of requisite tasks.

38. (New) A computer system according to claim 36, wherein said assigned thread is released back into said thread pool for subsequent assignment when the execution of said execution-ready requisite task is completed.

39. (New) A method for optimizing processing of an annotation request received from a client at a request processor, comprising the steps of:

- receiving said annotation request from said client;

- querying a memory to find relevant information corresponding to said annotation request;

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breaking said annotation request down into a plurality of constituent tasks needed to complete the execution of said annotation request, wherein said plurality of constituent tasks includes checking a cache to determine whether information pertaining to said annotation request is present in said cache;

storing said plurality of constituent tasks into a task queue;  
maintaining a plurality of threads assignable to said plurality of constituent tasks;  
assigning an available thread to a constituent task when said constituent task is ready for execution; and

executing the constituent task in the assigned thread on the request processor to completion concurrently with other threads executing tasks on the processor.

40. (New) A method according to claim 39, further comprising the steps of:  
identifying a plurality of I/O tasks from said plurality of constituent tasks;  
storing said plurality of I/O tasks into an I/O queue, separate from the task queue; and  
executing two or more of said plurality of I/O tasks in a parallel manner.

41. (New) A method according to claim 40, further comprising the step of:  
rendering one or more constituent tasks which require results from said executed I/O tasks ready for execution.

42. (New) A method according to claim 39, wherein said plurality of threads is persistent.

43. (New) A method according to claim 39, wherein said assigning of said available thread to said constituent task is independent of the nature of said constituent task.